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dressess and the abstracts of all the papers, as well as serving as a clearing house for scientific thought. The objection may be raised that publishing all the papers would make the *Transactions* too expensive. The answer to this is that the present fee should cover the general expenses and SCIENCE only, while the *Transactions* should be sold by subscription; each member subscribing for the *Transactions* of those sections in which he may be interested.

This plan would provide more time for the presentation of papers; provide meetings at which matters of somewhat local interest could be discussed; allow the sections a choice as to the place of meeting, and provide a place where all papers could be found instead of having them scattered through many periodicals. The economy of this plan as to both time and money would probably check the formation of new societies and also lead to the abandonment of many now organized; which are ends much to be desired.

ARTHUR H. FORD.

OUR FUTURE 'PUBLIC ANALYSTS.'

THE era of *scientific* investigation and protection of our food products and standard drugs, in distinction to the medico-political attempts of the past twenty years, is apparently at hand, and, as time will undoubtedly demonstrate, in proper hands. To be sure a certain few boards of health and food commissioners have at various times accomplished much in partial food inspection and one or two, notably the Massachusetts Board of Health, through its efficient secretary, Dr. Abbott, have rigidly inspected both foods and drugs for many years, bringing the universal fifty per cent. adulteration of those foods, etc., that can be adulterated, as shown by investigation statistics in other states, down to about fifteen per cent. and keeping it there. In these few widely separated states the legislatures will no doubt 'let well enough alone,' and, if appreciative at all of what has been accomplished, will increase the appropriation, which in nearly every case is absurdly small at present. In the forty odd states as yet unawakened or only partially awakened to a

realization of our national negligence in this great economic question, it is gradually becoming apparent that the state experiment stations are, or soon will be, the logical and most appropriate institutions to entrust the collection, investigation and subsequent defined inspection work to; the 'food commissioner' (if that be what he is called) being merely a prosecuting officer, which in general is the arrangement (and doubtless a satisfactory one) in Connecticut at present.

There are several gradually developing and well-founded reasons why we must begin to consider these well-organized, federal and state supported, scientifically equipped branches (in their chemical work) of the Bureau of Chemistry at Washington in this light. In the first place, there is very little adulteration of food products harmful from a hygienic standpoint. Physicians of course must be able to depend upon the strength of the drugs they prescribe, but otherwise the whole subject is really an economic one, closely related to agriculture, horticulture and animal industry, the three most important lines of experiment station work. Secondly, the Bureau of Chemistry, under Dr. Wiley's direction, already has charge of the examination of imported food products and, as soon as the long-delayed federal food law becomes effective, will have charge of the interstate commerce aspect of the question, thereby greatly assisting the states in their necessary local work. In several states, notably Connecticut, Pennsylvania and Kentucky, the experiment stations already carry on the state investigation and food inspection analysis work. Thirdly, these stations are financially and scientifically able to carry on research work upon the composition, nutritive value, utility, etc., of new or little-understood foods, simultaneously with official inspection work; and finally the chemists of these stations in their official association, commonly spoken of as the A. O. A. C., have recently studied, compiled and published provisional official methods of food analysis (at present, however, better adapted to investigation work rather than to rapid inspection and legal work), and defined the standards that legally pure food products should conform to.

In their annual convention in Washington, in November, a most important place in the program has been given to the whole subject, and soon afterwards many of the stations will undoubtedly establish special laboratories for investigation and possible inspection work, carrying out a suggestion made by the Office of Experiment Stations in Washington, a number of years ago (Bulletin No. 17).

So much for the experiment station and the probable part it will play in the solving of an economic question wherein we are a half century behind European nations. The natural and very important question next arising is relative to our future 'public analysts,' that comparatively large body of specially trained chemists, presumably young, considering the meager salaries usually allowed for routine laboratory work, who will be required in every state, and often at a moment's notice, by the experiment stations and by every state, county or municipal board of health or officer charged with the enforcement of locally protective legislation. These men will not only have to be already familiar with the modern methods of food and drug investigation and rapid legal inspection analysis, especially microscopical methods, which are frequently the only ones showing the nature and approximate proportion of the adulterant as the courts always require; but they will find that, upon the expert witness stand, a quite thorough knowledge of the natural composition, nutritive and economic value, utility, methods of adulteration and character of usual adulterants of foods is indispensable. The first contested prosecution, a grocer, backed by a large manufacturing concern and furnished with the best of legal aid and an experienced chemist looking for flaws and coaching said legal aid, was the experience demonstrating to the writer the above requirements; and one hundred and fifteen other mostly successful and often contested cases since, only serve to emphasize the fact in his mind.

In the British Isles the 'public analysts' constitute the best trained, most progressive and finely organized class of practical chemists to be found, their official association, the Society of Public Analysts, being always con-

sulted by the government on any subject involving analytical chemistry, and their journal, *The Analyst*, being the leading and almost the only publication devoted to analytical chemistry in the English language. These chemists are trained in special schools or special university courses and, after passing an examination, including the whole subject of foods and drugs and their chemical and microscopical examination, are admitted to membership in the Institute of Chemistry and become eligible to appointment by counties or municipalities inspecting or intending to inspect the local food, drug and water supplies. Now let us turn to the status of affairs in our own country. It is said, and it will be generally admitted as true, that if, in the season of legislative activity, a half dozen of the as yet unawakened states were to pass laws protecting and governing the sale of foods and drugs, it would be impossible to find the necessary number of specially trained analysts ready and competent to undertake the work at hand. Of course, plenty of chemists with the ordinary college training in analytical chemistry or some other special training would be found and appointed, but so long a period of confidence acquiring study and practise would be necessary before any prosecutions were advisable, that the temporarily enthused legislature and public would forget about and lose all interest in the work and decide that it had been found to be unnecessary or impolitic—a condition of affairs that the grocery and druggist organizations would not be slow to take advantage of, as has been shown more than once in the not remote past.

Yale University has recently outlined courses in several of the afore-mentioned necessary subjects, and has engaged Winton, state chemist at the Connecticut Experiment Station, to give the necessary instruction in lectures and laboratory work. A few other large universities are planning to, and doubtless will, introduce similar and perhaps more complete courses in the near future. With the exception of Yale and possibly Harvard, however, they will not have the distinct advantage of having the students brought in

direct contact with official work and official chemists. In the forty-eight state colleges or universities, partially supported by the federal government through the land grant and Morrill acts, we have, however, practically the same number of very conveniently situated and well-equipped institutions for training, at least the locally needed, public analysts of the future. That their location is especially fortunate for this purpose is due to the fact that nearly all the experiment stations are located in the same towns and in fact are often really departments of the university or college, with a staff made up principally of members of the college faculty. Some of these public educational system extensions, Cornell University and the University of California, for examples, must of course be considered as better officered and equipped than many of the others, especially those in the far south and southwest.

All, however, if their catalogues and the Office of Experiment Stations statistics are trustworthy, have the facilities (departments, professors and laboratories) wherewith to give instruction in the subject of foods, their composition, nutritive and economic value, methods of adulteration and detection of the same, etc.; and in the senior year or as post-graduate assistants give the students an opportunity to gain an insight into and a little actual experience in food investigation work, and also if possible, in methods of rapid legal inspection work at the local experiment station, or at least from the official chemists of these stations. The preparatory subjects, which we may consider as junior year electives, would include organic chemistry and outlines of organic analytical methods (fat extractions, melting point determinations, etc.), histological botany and microscopy and physiology, especially the subjects of nutrition, digestion and assimilation. In the senior year the really special studies would be undertaken, viz., the study of foods as previously outlined; the natural composition, nutritive and economic value, utility, methods of adulteration, etc., of foods being taught by lectures, while the methods of scientific investigation and

rapid legal inspection, especially the use of the microscope and the utilization of histological botany, would be taught simultaneously in the laboratory.

Whether this senior year specialization led to a special degree, or to the ordinary bachelor's degree in science only, is immaterial. One thing is assuredly certain, however, and that is that such a comparatively simple, wholly possible and practicable course of training, especially if supplemented with actual experience in the local experiment station, would supply a national and soon to be a pressing need for competent trained 'public analysts,' similar to those regarded necessary by the smallest and least pretentious English towns and cities. Then, and then only, will our American Society of Public Analysts acquire a membership and influence sufficient to warrant its admittance as a section of the older society in the mother country or, perhaps, what is more patriotic, a similar relationship to the American Chemical Society.

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THE MISUSE OF 'FORMATION' BY ECOLOGISTS.

GEOLOGISTS, paleobotanists and a few botanists have several times called attention during the past few years to the persistent misuse by many ecologists of the word 'formation,' when referring to plant societies or associations. Regardless of the sanction of a century or more of usage for 'formation' in the geological sense, they have proceeded within the past dozen years to transplant the word, *viâ* Germany, into English botanical literature, unmindful of the fact that where employed in the German language it is little or not at all confusing, but when translated into English comes in direct competition with well-established usage in other fields. The usual reply to these protests has been that this employment of 'formation' has the sanction of the earlier writers in this 'newly discovered' field of ecology, and, moreover, is hardly likely to lead to any serious confusion with its use in geology, mineralogy or paleobotany. If those